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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MPI Cluster: 8 Processes (-np 8) over 8 Hosts** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.782 | 0.762 | 0.855 | 0.814 | 0.795 | 2.251 | 0.442 | 0.430 | 0.876 | 0.425 |
| **Avg (s)** | 0.843 | | | | | | | | | |
| **Median (s)** | 0.789 | | | | | | | | | |

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| **MPI Cluster: 4 Processes (-np 4) over 4 Hosts** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.318 | 0.331 | 0.333 | 0.381 | 0.322 | 0.319 | 0.333 | 0.332 | 0.323 | 0.332 |
| **Avg (s)** | 0.332 | | | | | | | | | |
| **Median (s)** | 0.332 | | | | | | | | | |

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| **MPI Cluster: 8 Processes (-np 8) over 4 Hosts** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.295 | 0.547 | 0.750 | 0.316 | 0.311 | 0.292 | 0.353 | 0.294 | 0.291 | 0.292 |
| **Avg (s)** | 0.374 | | | | | | | | | |
| **Median (s)** | 0.303 | | | | | | | | | |

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| **MPI Cluster: 8 Processes (-np 8) over 2 Hosts** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.167 | 0.170 | 0.173 | 0.161 | 0.168 | 0.175 | 0.214 | 0.211 | 0.160 | 0.166 |
| **Avg (s)** | 0.177 | | | | | | | | | |
| **Median (s)** | 0.169 | | | | | | | | | |

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| **MPI Cluster: 4 Processes (-np 4) over 2 Hosts** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.174 | 0.176 | 0.179 | 0.174 | 0.175 | 0.176 | 0.176 | 0.178 | 0.173 | 0.175 |
| **Avg (s)** | 0.176 | | | | | | | | | |
| **Median (s)** | 0.176 | | | | | | | | | |

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| **MPI Cluster: 2 Processes (-np 2) over 2 Hosts** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.167 | 0.166 | 0.169 | 0.168 | 0.169 | 0.167 | 0.169 | 0.169 | 0.170 | 0.168 |
| **Avg (s)** | 0.168 | | | | | | | | | |
| **Median (s)** | 0.169 | | | | | | | | | |

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| **MPI Cluster: 1 Process (-np 1) over 2 Hosts** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.015 | 0.015 | 0.016 | 0.015 | 0.018 | 0.017 | 0.015 | 0.019 | 0.015 | 0.014 |
| **Avg (s)** | 0.016 | | | | | | | | | |
| **Median (s)** | 0.015 | | | | | | | | | |

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| **MPI Cluster: 1 Process (-np 1) over 1 Host** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.015 | 0.016 | 0.017 | 0.015 | 0.015 | 0.017 | 0.013 | 0.014 | 0.019 | 0.014 |
| **Avg (s)** | 0.016 | | | | | | | | | |
| **Median (s)** | 0.015 | | | | | | | | | |

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| **MPI Single Machine: 8 Processes (-np 8)** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.0048 | 0.0048 | 0.0048 | 0.0045 | 0.0048 | 0.0047 | 0.0058 | 0.0047 | 0.0049 | 0.0044 |
| **Avg (s)** | 0.00488 | | | | | | | | | |
| **Median (s)** | 0.0048 | | | | | | | | | |

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| **MPI Single Machine: 4 Processes (-np 4)** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.0191 | 0.0048 | 0.0640 | 0.0046 | 0.0050 | 0.0119 | 0.0048 | 0.0046 | 0.0046 | 0.0048 |
| **Avg (s)** | 0.01285 | | | | | | | | | |
| **Median (s)** | 0.0049 | | | | | | | | | |

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| **MPI Single Machine: 2 Processes (-np 2)** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.0082 | 0.0083 | 0.0081 | 0.0084 | 0.0083 | 0.0080 | 0.0082 | 0.0080 | 0.0082 | 0.0083 |
| **Avg (s)** | 0.008243 | | | | | | | | | |
| **Median (s)** | 0.0083 | | | | | | | | | |

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| **Single Machine: Serial Implementation (1 Process), No MPI** | | | | | | | | | | |
| **#** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Time (s)** | 0.0757 | 0.0752 | 0.0755 | 0.0759 | 0.0753 | 0.0755 | 0.0759 | 0.0753 | 0.0757 | 0.0756 |
| **Avg (s)** | 0.07556 | | | | | | | | | |
| **Median (s)** | 0.0756 | | | | | | | | | |

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| Summary of Data | | |
| # Processes | # Host Machines | Average Time (s) |
| 8 | 8 | 0.843 |
| 4 | 4 | 0.332 |
| 8 | 4 | 0.374 |
| 8 | 2 | 0.177 |
| 4 | 2 | 0.176 |
| 2 | 2 | 0.168 |
| 1 | 2 | 0.016 |
| 1 | 1 | 0.016 |
| 8 | 1 | 0.00488 |
| 4 | 1 | 0.01285 |
| 2 | 1 | 0.008243 |
| 1 | 1 | 0.07556 |